

# THE HOST PLANTS OF THE LIME LEAF-MINING SAWFLY, *PARNA TENELLA* (KLUG) (HYM: TENTHREDINIDAE) IN BRITAIN

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## ABSTRACT

A survey of three public gardens in England has shown that many native and introduced lime trees (*Tilia* spp., hybrids and cultivars) are host plants for the leaf-mining sawfly, *Parua tenella* (Klug) (Hymenoptera: Tenthredinidae). This survey extends the previously recorded host range for this insect in Britain.

## INTRODUCTION

*Parua tenella* (Klug) was first confirmed as occurring in Britain in 1921 when Morice (1922) found adults flying round a lime tree in his garden in Woking, Surrey. Cameron (1882) had earlier referred to a mined *Tilia* × *europaea* L. leaf sent to him by H.T. Stainton but otherwise this insect was unknown to him. Benson's RES key (1952) describes it as "local, probably throughout England and S. Scotland, but not found north of Firth of Forth". He gave the host plants as *Tilia platyphyllos* Scop. and *T. cordata* Mill. *Parua tenella* is widely distributed in Europe across to Russia but is absent from the Mediterranean region (Liston, 1995). Liston gives the same host plants as Benson, with the addition of *Tilia* × *europaea*. These trees are native to Britain, although *Tilia* × *europaea* and *T. platyphyllos* are mainly found as planted trees (Preston *et al.*, 2002).

*Parua tenella* appears to have a single generation with adults emerging and laying eggs in May–June. A female was found by the author on a lime tree at Knaphill, Surrey on 4.vii.01, which is likely to be either a late emergence or perhaps evidence of a partial second generation. Eggs are laid singly in the leaf margin and the affected leaf margins roll upwards, presumably as a result of secretions produced by either the female during oviposition or by the newly hatched larva. On large leaves the rolling occurs at the basal end of the leaf but on small leaves the whole margin on one side curls. Some leaves have both margins curled upwards where eggs were laid on both edges of the leaf. The larva creates a blotch mine within the rolled leaf margin and in its final stages the mine can extend into the uncurled central area of the leaf. The larva's frass is deposited in rows and consists of black, flattened, elongate, rectangular pellets which can be up to 2mm long. Upward leaf curling on lime leaves can also be caused by certain cecidomyiid fly larvae (Redfern & Shirley, 2002) but these gall midge larvae do not cause any leaf mining. The sawfly larvae complete their feeding during June–early July and then go into the soil where they overwinter.

The Arboretum at the RHS Garden, Wisley (TQ0657) contains many *Tilia* species, hybrids and cultivars. A survey in 2001 showed that the lime leaf-mining sawfly was using a much wider range of limes than indicated by the literature. This survey was repeated in 2002 and the holders of National Plant Collections of *Tilia* for the National Council for the Conservation of Plants and Gardens (NCCPG) were also invited to check their trees for this insect. There are two National Collections of *Tilia* which are located at Thorp Perrow Arboretum, Bedale, North Yorkshire (SE2685) and Peasmarsh Place Arboretum, Rye, Sussex (TQ8821). The curators of these collections were sent samples of mined leaves to ensure they would recognise the type of damage caused by the sawfly.

## RESULTS

The lime trees at Wisley Garden (WG) were surveyed for signs of leaf mining on 26.vi.01, and on 12 and 19.vi.02. The curators at Thorp Perrow Arboretum (TPA) and Peasmarsh Place Arboretum (PPA) surveyed their trees on 26 and 29.vi.02, respectively.

***Tilia* species, hybrids and cultivars with mined leaves**

*T. americana* L. WG 2001, WG 2002  
*T. americana* L. 'Dentata' WG 2001, WG 2002  
*T. americana* L. 'Redmond' WG 2001, WG 2002  
*T. chennoni* Cheng PPA  
*T. chinensis* Maxim. WG 2001, WG 2002  
*T. chingiana* Hu & Cheng WG 2002  
*T. cordata* Mill. WG 2001, WG 2002, TPA, PPA  
*T. cordata* Mill. 'Greenspire' PPA  
*T. cordata* Mill. 'Lico' WG 2002  
*T. cordata* Mill. 'Rancho' WG 2002  
*T. cordata* Mill. ssp. *sibirica* PPA  
*T. cordata* Mill. 'Winter Orange' WG 2001, WG 2002  
*T. × enropaea* L. WG 2001, WG 2002  
*T. × enropaea* L. 'Pallida' WG 2001, WG 2002  
*T. × enropaea* L. 'Wratislaviensis' WG 2001, WG 2002  
*T. heterophylla* Vent. WG 2001, WG 2002, TPA  
*T. heterophylla* Vent. var. *michauxii* (Nutt.) WG 2002  
*T. mexicana* Schldl. WG 2002  
*T. 'Moltkei'* Spath ex Schneid. WG 2002  
*T. mongolica* Maxim. WG 2001  
*T. oliveri* Szysz. WG 2001, WG 2002  
*T. platyphyllos* Scop. WG 2001, TPA  
*T. platyphyllos* Scop. 'Aurea' WG 2001

The following limes at Wisley Garden had no signs of damage by the leaf miner in 2001 and 2002. Where these trees were also grown without symptoms at Peasmarsh Place Arboretum and/or Thorp Perrow Arboretum, this is indicated after the tree's name by PPA and/or TPA.

*Tilia amurensis* Rupr., PPA, TPA; *T. caroliniana* Mill., PPA; *T. dasystyla* Steven ssp. *cancasica* (V. Engl.) C. D. Pigott; *T. dasystyla* ssp. *dasystyla* Steven; *T. dasystyla* Steven ssp. *yelta* 291; *Tilia* 'Emerald Spire'; *T. henryana* Szysz., PPA, TPA; *T. henryana* Szysz. var. *snbglabrata* Engler, PPA, TPA; *T. insularis* Nakai, PPA, TPA; *T. japonica* (Miq.) Simonkai, PPA, TPA; *T. kinsiana* Makino & Shirasawa, PPA, TPA; *T. koreana* Nakai, TPA; *T. orbicularis* (Carr.) Jouin, PPA; *T. petiolaris* DC., PPA, TPA; *T. platyphyllos* Scop. 'Laciniata', TPA; *T. tomentosa* Moench., PPA, TPA; *T. tnan* Szysz.

The following trees are not grown at Wisley Garden but were present in 2002 without symptoms in one or both of the National Collections of limes.

*Tilia × euchlora* K. Koch, PPA, TPA; *Tilia* 'Harold Hillier', TPA;  
*T. insularis* × *mongolica* PPA; *T. insularis* × *maximowicziana* PPA;  
*T. intonsa* Wils. Ex Rehd. & Wils., PPA, TPA; *T. lactivirens* Rehd. & Wils. TPA;  
*T. mandshurica* Rupr & Maxim., TPA;  
*T. maximowicziana* Shirasawa, PPA, TPA; *T. miqueliana* Maxim., PPA, TPA;

*T. mongolica* × *euchlora*, PPA; *T. neglecta* Spach., PPA, TPA; *T. nobilis* Rehd. & Wils., PPA; *T. taqueti* C. K. Schneider, PPA

#### DISCUSSION

*Parna tenella* is present in all three *Tilia* collections that have been surveyed but this insect seems to occur on a much wider range of *Tilia* spp. at Wisley Garden compared with Peasmarsh Place Arboretum or Thorp Perrow Arboretum. At the latter, the only host plant, other than those already recorded in the literature, was *T. heterophylla*. Peasmarsh Place added *T. cheunouii*; this is also grown at the other two gardens, where it was free of signs of leaf miner. It is, of course, possible to overlook the presence of this sawfly, especially if there are only a few mined leaves on a large tree. It is also possible that some of the trees on which *P. tenella* has not yet been recorded, may in time prove to be host plants. At Wisley Garden most of the species, hybrids and cultivars that were attacked in 2001 were also used by the sawfly in 2002 but there were some trees that appeared to be free of sawfly in one of the two years.

Although *P. tenella* is the only leaf-mining sawfly recorded on *Tilia* at Wisley Garden and elsewhere in Britain, there is a possibility that other species could occur. Worldwide there are three other *Parna* spp., of which at least two are associated with *Tilia* spp. Apart from *P. tenella*, there is *P. babai* Togashi and *P. kamijoi* Togashi, both of which occur in Japan. The last mentioned mines the foliage of *T. maximowicziana*. A new species, *Parna reseri* Liston, has been described by Liston (1993) and is associated with *T. cordata*. Unlike *P. tenella*, leaves mined by *P. reseri* do not have rolled margins (A. D. Liston, pers. com.). It has been found in Austria, France and Poland (Liston, 1995). Heidema & Viitasaari (1997) give additional locations in the Czech Republic, Estonia and Finland. The three non-British *Parna* spp. reproduce by thelytokous parthenogenesis and, as a consequence, males are absent or scarce. However, *P. tenella* has the normal haplo-diploid reproduction seen in Hymenoptera, giving rise to both males and females.

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